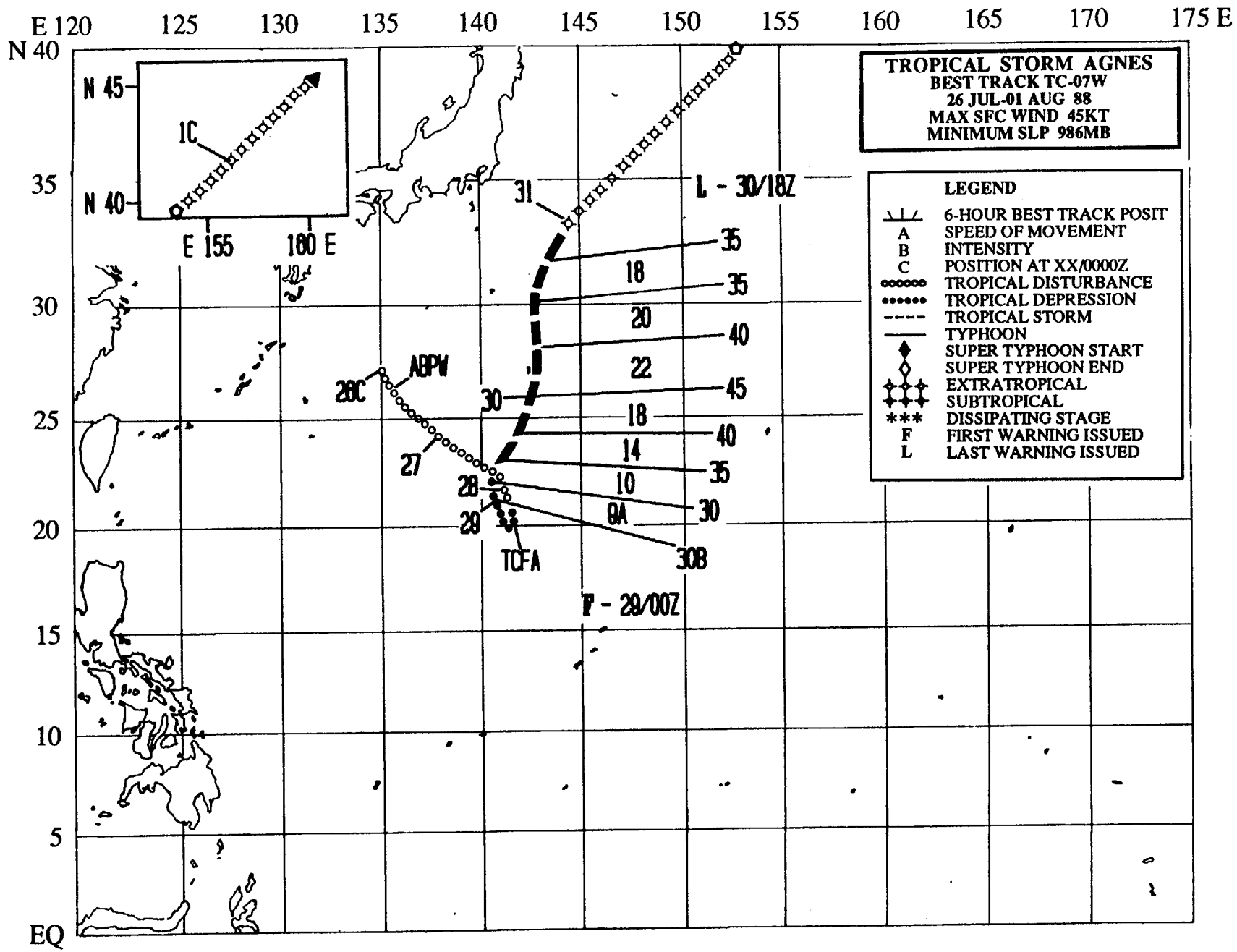
TROPICAL STORM AGNES
BEST TRACK TC-07W
26 JUL-01 AUG 88
MAX SFC WIND 45KT
MINIMUM SLP 986MB
LEGEND
6-HOUR BEST TRACK POSIT
A SPEED OF MOVEMENT
B INTENSITY
C POSITION AT XX/0000Z
TROPICAL DISTURBANCE
TROPICAL DEPRESSION
TROPICAL STORM
TYPHOON
SUPER TYPHOON START
SUPER TYPHOON END
EXTRATROPICAL
SUBTROPICAL
*** DISSIPATING STAGE
F FIRST WARNING ISSUED
L LAST WARNING ISSUED
E 120
125
130
135
140
145
150
155
160
165
170
175 E
N 40
35
30
25
20
15
10
5
EQ
N 45
N 40
E 155
160 E
1C
31
35
18
35
20
40
22
45
30
18
40
14
35
10
30
9A
30B
L - 30/18Z
F - 29/00Z
28C
ABPW
27
28
29
TCFA

TROPICAL STORM AGNES (07W)

Agnes was of note in several respects. It was the second of only two tropical cyclones to develop in July, a month that normally averages five. It played a part in the major shift of the synoptic pattern in the western North Pacific in the latter part of July and later became a small, but vigorous, extratropical cyclone.

As Typhoon Warren (06W) moved into southern China on 19 July, lower tropospheric ridging and fair weather prevailed over eastern China and the Philippine Sea. Once Warren (06W) dissipated, the monsoon trough, instead of maintaining its climatological position across the northern Philippine Islands and southern Philippine Sea, remained over Asia. Southeast of Japan, an area of disturbed weather with lower than normal sea-level pressures and enhanced convection generated in the lower tropospheric troughing (Figure 3-07-1). By 27 July, a closed circulation and supporting southwesterly monsoonal flow at 700 mb had developed along this trough (Figure 3-07-2).

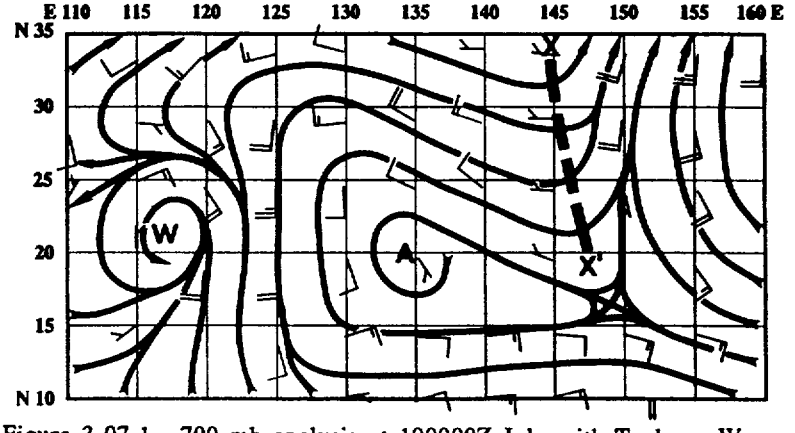

Figure 3-07-1. 700 mb analysis at 190000Z July with Typhoon Warren (06W)(point W) and troughing (line X to X') southeast of Japan.

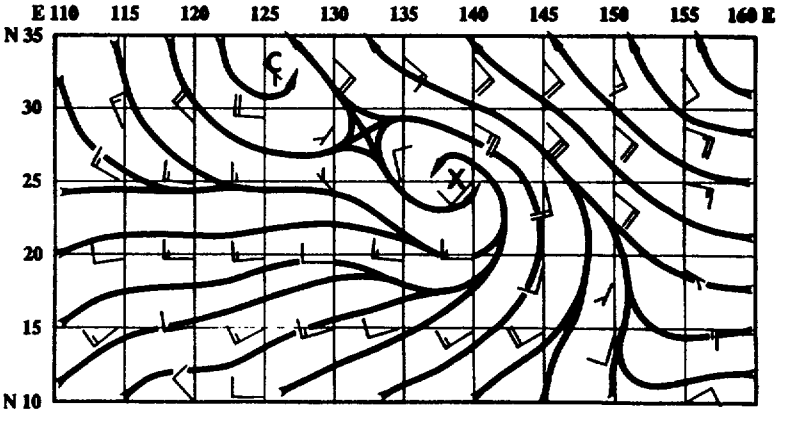

Figure 3-07-2. 270000Z July 700 mb analysis with a closed cyclonic circulation (at point X) and deep west-southwesterly monsoonal flow.

At first, Agnes appeared as a monsoon depression with a low-level cyclonic circulation and deep convection displaced to the south by vertical shear aloft. This was discussed in the Significant Tropical Weather Advisory at 260600Z. The suspect area drifted southeastward in the trough and had a poor potential for development into a significant tropical cyclone due to the unfavorable vertical wind shear of 35 kt (18 m/sec.) When the vertical wind shear dropped to 20 kt (10 m/sec) at 280600Z and satellite imagery indicated increased upper-level outflow and deep convection, the system's potential for significant development was upgraded to "fair". A Tropical Cyclone Formation Alert was issued at 281500Z based on a satellite intensity estimate of 25 kt (13 m/sec). The continued increase in the system's deep convection and overall organization led to the first warning at 290000Z.

Initially, Agnes was forecast to intensify, separate from the monsoon trough and track to the northwest. However, the monsoon trough, which was farther north than normal, merged with a mid-latitude low pressure system to the northeast of Japan. Agnes followed the path of least resistance and accelerated to the north-northeast along this trough axis. The tropical cyclone was upgraded to tropical storm intensity at 291200Z and reached its peak intensity (Figure 3-07-3) of 45 kt (23 m/sec) 12-hours later. The loss of persistent central convection at 301200Z resulted in the issuance of the final warning at 301800Z.

Unfavorable vertical shear from the strong southwesterlies aloft increased and Agnes (Figure 3-07-4) accelerated north-northeastward at more than 30 kt (56 km/hr). Although the system appeared to be

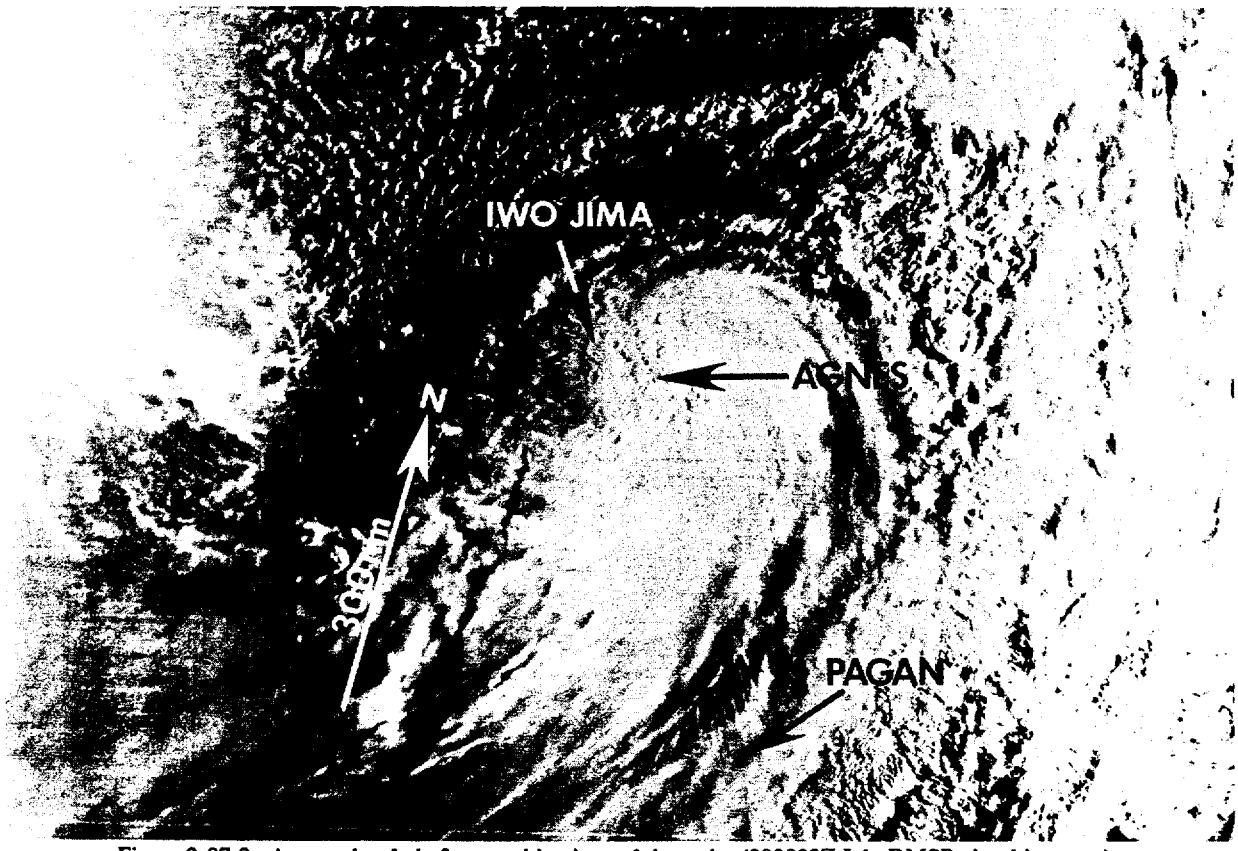

Figure 3-07-3. Agnes, shortly before reaching its peak intensity (292023Z July DMSP visual imagery).

extratropical at 310000Z, ships in the right front quadrant (relative to the forward motion) of this hybrid system reported maximum sustained surface winds of 60 kt (31 m/sec) at 310600Z and 50 kt (26 m/sec) at 311200Z. Herbert and Poteat (1975) address this type of system, or subtropical cyclone, where translational speeds greater than 20 kt (37 km/hr) are added to the intensity estimate determined from the cloud signature. Even though the final warning was issued when the system was at 32 degrees North, Agnes stubbornly maintained some of its tropical characteristics well into the mid-latitudes. No reports of casualties or damages were received.

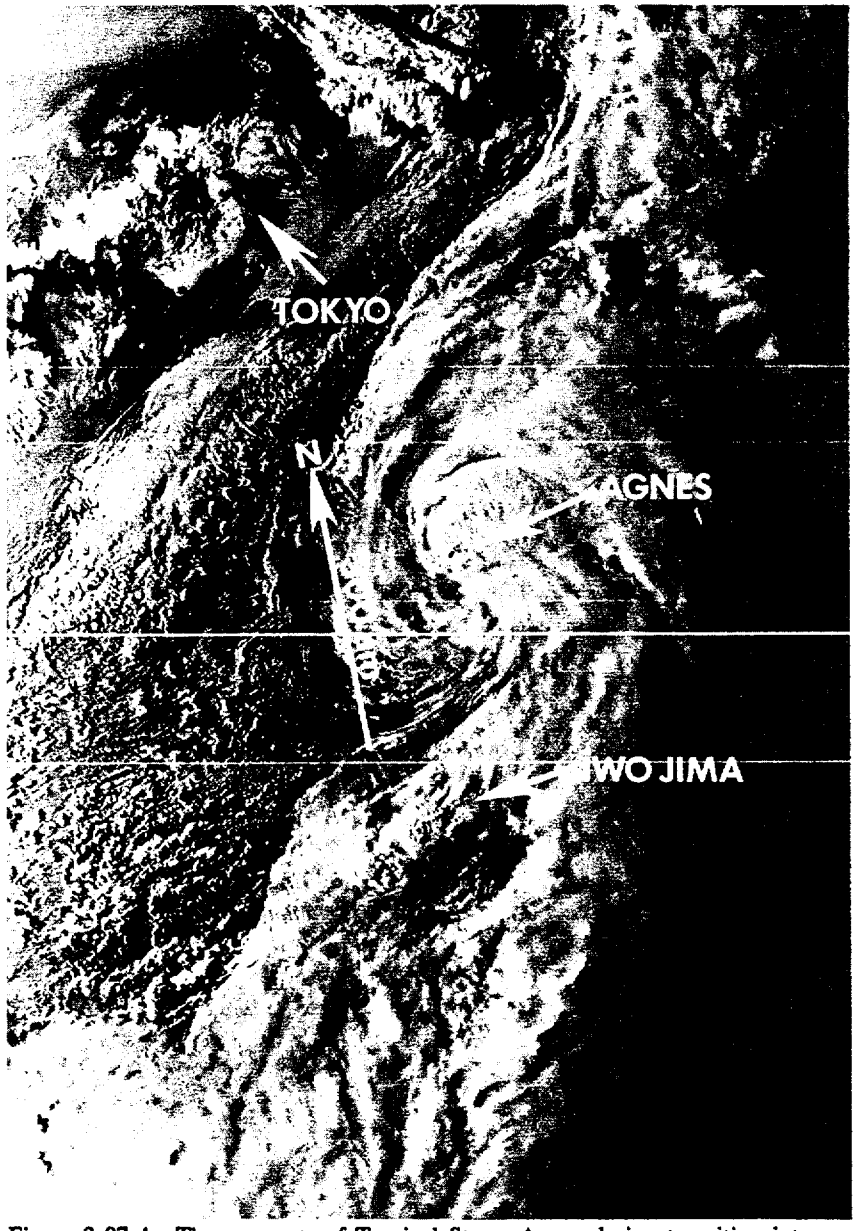

Figure 3-07-4. The remnants of Tropical Storm Agnes during transition into an extratropical system (301829Z July NOAA infrared imagery).